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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/089,358
Filing Date: May 13, 2002
Appellant(s): BERNETH ET AL.

John E. Mrozinski, Jr. (46,179)
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed April 6, 2009 appealing from the Office action mailed June 6, 2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

Withdrawn Claims 19-24,27 and 28 are not part of the appeal and do not appear in the listing of claims.

(4) Status of Amendments After Final the brief is correct.

The appellant's statement of the status of amendments after final rejection contained in

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

4666819	Elmasry	05/1987
97/44365	Berneth et al.	11/1997
4336545	Howe et a.	06/1982
5384221	Savant et al.	01/1995
5691092	Ninomiya et al.	11/1997
669548	Akashi et al.	08/1995

Andruzzi et al. "holographic gratings in azobenzene side chain polymethylmethacrylates", Macromol. Vol. 32 pp. 448-454 (01/1999).

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

1. Claims 1-4,7-9,12,13,15-18 and 29-30 are rejected under 35 U.S.C. 103(a) as obvious over Elmasry '819 and Berneth et al. WO/ 9744365, in view of Andruzzi et al., "holographic gratings in azobenzene side chains polymethylmethacrylates", Macromol. Vol. 32(2) pp. 448-454 (01/1999), Howe et al. '545 and Savant et al. '221.

Berneth et al. WO 97/44365 teaches the use of laser powers of 10^3 to 10^7 mJ/m^2 (0.1-1,000 mJ/cm^2) with times of 10^{-15} to 10^{-3} second for writing patterns using polarized light. (page 5/lines 4-15). The spot sizes may be 10 nm to 20 microns (page 5/lines 17-19). Examples of useful dye include those disclosed on pages 6-20, which are pendent to the polymer backbone. Exemplified dyes are shown in the examples. The thickness of the layers may be 0.1-500 microns ([page 23/lines 24+). The use of these in holographic, analog or digital recording processes is disclosed. (24/26-25/20). In example 1, the polymer illustrated on page 27 is applied to a 2x2 cm glass plate by spin coating and pre-exposed using a light box for two hours (section 1.1, page 27). This was then inscribed using an argon ion laser operating at 280 mW with a laser spot size of 7-8 microns, an inscribing energy "E" of 10^6 mJ/m^2 (100 mJ/cm^2) at a scan rate of 23.8 m/sec (section 1.3, pages 28-29). The dyes are those embraced by the language on pages 7-21 describing pendant chromophores and anisotropic moieties.

Elmasry '819 in example 9 has a glass substrate coated with aluminum and a polymeric azo dye having the structure shown is coated to a thickness of 0.15 microns. This is exposed to a laser modulated by an acousto-optic modulator. The exposure conditions are for beam diameters of 0.5 to 50 microns, with 1 micron or less being used in the examples. The scanning speeds result in 45-55 ns exposures and the laser output at the recording layer is 1-150 mW, preferably 2-25 mW as in the examples. (6/17-36). The readout of the deformation is optical (5/61-6/11). Sample 1 in table 1 describes an exposure of 0.01 ergs/dot (1 x 10^{-9} J/spot) which assuming a 1 micron spot size is 0.127 J/cm^2 at a laser power in the 2-25 mW range.

Howe et al. '545 teaches thermal deformation of dye/binder recording media, where the pit depth is 55 nm (12/40-44). The media have a substrate coated with a reflective layer and a the dye/binder layer. as shown in figure 3. The use of $\pi/2$ pit depths is disclosed. (12/55-63)

Andruzzi et al., "holographic gratings in azobenzene side chains polymethylmethacrylates", Macromol. Vol. 32(2) pp. 448-454 (01/1999) teaches that the reordering of the azobenzene compounds formed from the monomers on page 448 can be used to form gratings with relief features in the 90-1340 nm range as evidenced in table 4 (page 453).

Savant et al. '221 in examples XIII-XX has a glass substrate and a polymeric azo dye coated to a thickness between 20- and 35 microns. This is exposed to a laser modulated by an electro-optic modulator which varies the polarization and is readout using polarized light and detecting the polarization of the reflected light.

It would have been obvious to one skilled in the art to one skilled in the art to modify the cited example of Berneth et al. WO/ 9744365 by adding a reflective layer as taught by Elmasry '819 and Savant et al. '221 and further to use modulation means, such as the acousto-optic modulator taught by Elmasry '819, in place of the EOM with a reasonable expectation of being able to record data and read it out using the techniques disclosed by Elmasry '819 and/or Savant et al. '221 with a reasonable expectation of successfully forming the recited depression based upon the teachings of Andruzzi et al., "holographic gratings in azobenzene side chains polymethylmethacrylates", Macromol. Vol. 32(2) pp. 448-454 (01/1999) and Howe et al. '545.

Alternatively it would have been obvious to modify the cited examples 4 and 5 of Elmasry '819 which assuming a 1 micron spot size records at 0.127 J/cm^2 at a laser power of 20mW and reading the information by using the azobenzene polymers, such as those taught by

Berneth et al. WO/ 9744365 with a reasonable expectation of forming features of ~1 micron in diameter and depths of more than 10 nm based upon the teachings of Andruzzi et al., "holographic gratings in azobenzene side chains polymethylmethacrylates", Macromol. Vol. 32(2) pp. 448-454 (01/1999) and Howe et al. '545. Further it would have been obvious to use the readout processes taught by both Elmasry '819 and Howe et al. '545 which relies upon the change in the reflectance based upon interferometric changes (phase change/shift) due to changes in the thickness of the layer caused by the deformation recording.

Elmasry '819, Savant et al. '221 and Howe et al. '545 teaches readout of deformation recorded media, with Elmasry '819 specifically relating to azo polymeric dyes. In addition the deformation by melting as taught by Elmasry '819 and Howe et al. '545, the orientation of the azobenzene will also contribute to the change in topography as taught by Andruzzi et al., "holographic gratings in azobenzene side chains polymethylmethacrylates", Macromol. Vol. 32(2) pp. 448-454 (01/1999) which uses polymeric dyes similar to those of Berneth et al. WO/ 9744365 and contributions from birefringence as discussed by Berneth et al. WO/ 9744365. The chemistry is relatively unimportant, the (pendant) chromophore must absorb the light to cause the deformation and the polymer (binder or polymeric backbone) controls the sensitivity based upon the Tg of the resulting composition. The mode of readout discussed in the instant application is clearly discussed by Elmasry '819 and particularly Howe et al. '545, who teaches the use of interferometric thicknesses for the recording layer to optimize the contrast. If the applicant wants to limit the recording to optical profileometers, then the claims should state this. (see specification at page 39).

2. Claims 1-5,7-9,12-18 and 29-30 are rejected under 35 U.S.C. 103(a) as obvious over Elmasry '819 and Berneth et al. WO/ 9744365, in view of Andruzzi et al., "holographic gratings in azobenzene side chains polymethylmethacrylates", Macromol. Vol. 32(2) pp. 448-454 (01/1999), Howe et al. '545 and Savant et al. '221, further in view of Ninomiya et al. '092 or Akashi et al. EP 669548.

Ninomiya et al. '092 teach LC recording layers provided on polymeric substrates (12/35-41). The overcoating of the LC polymers layer with a surface protective layer is disclosed to provide resistance to damage from abrasion, heat and the like (12/60-65). Useful materials for the surface protective layer include UV curable resins and the like including various acrylates (13/1-58).

Akashi et al. EP 669548 teaches in example 1, an LC materials applied to an Al coated polyethylene substrate and overcoated with a UV curable layer. (pages 11-12.) The use of azo dyes is disclosed with respect to the formulae a-k and the fact that X and Y may be N=N as discussed in page 5. The use of azobenzene is also specifically described. On page 4 at line 26. Useful protective layers are described. (9/6-9).

It would have been obvious to one skilled in the art to modify the media rendered obvious by the combination of Elmasry '819 and Berneth et al. WO/ 9744365, with Andruzzi et al., "holographic gratings in azobenzene side chains polymethylmethacrylates", Macromol. Vol. 32(2) pp. 448-454 (01/1999), Howe et al. '545 and Savant et al. '221 by adding a protective layer know to be useful with LC materials, such as those disclosed by Akashi et al. EP 669548 or Ninomiya et al. '092 with a reasonable expectation of forming a useful azo based LC recording medium which is protected from mechanical damage. Further it would have been

obvious to use other substrate materials, such as the polymers disclosed by Ninomiya et al. '092 or Akashi et al. EP 669548, in place of the glass substrate exemplified by Berneth et al. WO/ 9744365 with Elmasry '819 and Savant et al. '221with a reasonable expectation of success based upon the disclosure of equivalent functionality.

(10) Response to Argument

The applicant argues Elmasry relates to an entirely different recording process, specifically deformation recording and that the signal is described in terms of signal differences and that one of ordinary skill in the art would not recognize the cause of these signal differences. (brief at page 9). The examiner disagrees, pointing out that the cited example 9 uses a polymeric azo dye where the dye is in the side chain similar to the dyes of the claims and is written upon and readout using a laser. Therefore the art is relevant to the claimed invention and the other optical recording media art applied in the rejection. The reflection differences are clearly due to the deformation of the polymeric azo dye film (i.e. a change in topography) as discussed with respect to figure 5 at 5/61-6/12).

The applicant points out that Berneth reads the data using birefringence and does not discuss changes in surface topography or that surface deformations can be detected for readout. (brief at page 9). The applicant is correct that Berneth, while teaching the polymeric dyes of the claims and the writing exposure parameters, fails to teach that the recording process results in the formation of depressions/topography and uses a different technique (changes in birefringence) for readout. In response to applicant's arguments against the reference(s) individually, one

cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The examiner relies upon Elmasery et al. and Andruzzi et al., "holographic gratings in azobenzene side chains polymethylmethacrylates", Macromol. Vol. 32(2) pp. 448-454 (01/1999) to establish the laser recording in the polymeric azo dyes inherently results in changes in the surface topography (i.e. depressions).

The applicant argues that Andruzzi et al. is to a different recording process than the claimed invention. (brief at pages 9-10) The applicant is correct in that the information recorded is different, but it is still laser recording and it serves to evidence that the laser recording of a polymeric azo dye results in changes in topography. Further, the Berneth reference describes recording optical information including holographic information. Therefore Andruzzi et al. is related art.

The applicant argues that Howe et al. fails to suggest the features of the claimed process. (brief at page 10). As discussed above, the rejection is not based upon a single reference and so Howe is not relied upon to teach the entire invention, but to establish the phase shift (interferometric) based readout of the depression data. Specifically, the optical distance (the product of the physical distance and the refractive index) is changed due to the depression formation and that this represents a phase shift ($\pi/2$) which is measured as a change in the reflectance.

The applicant argues that Savant et al. uses changes in the birefringence in the readout process. (brief at page 10) As discussed above, the rejection is not based upon a single reference and so Savant et al. is not relied upon to teach the entire invention, but to establish the use of reflected light to readout the data of an azo polymer recording medium in a manner similar to that of Howe et al. based upon the use of a reflective layer and to teach the use of polarized light in the measurement process as discussed in claim 18.

The applicant argues on pages 11 and 12, that the Ninomiya et al. '092 and Akashi et al. EP 669548 references are non-analogous and the one skilled in the art would not consider them combinable with the other references applied. This position fails to appreciate that the materials of Berneth include LC moieties (optical anisotropy) and so this reference renders them analogous as the Berneth reference teaches the polymers having both azo and LC sidechains and thereby unites these arts.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Martin J Angebranndt/
Primary Examiner, Art Unit 1795

June 24, 2009

Conferees:

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